

WHAT IS CLAIMED IS:

1. A method for mounting a light emitting element by suctioning a first part serving as a light emitting element having an optic axis toward the horizontal direction at the lower end portion of a suction head, and mounting the first part while aligning the first part with a second part held on a stage, the method comprising the steps of:

preparing a first optical system disposed above said suction head;

preparing a second optical system disposed below said stage such that the optic axis thereof and the first optical system generally face each other; and

preparing a third optical system disposed such that the optic axis thereof and the first optical system are generally orthogonal;

inserting the suction head between the first optical system and the second optical system, capturing a head reference mark, which is appended to the suction head and can be recognized from above, using the first optical system, capturing the first part suctioned at the suction head using the second optical system, making the first part emit light, and recognizing the optic axis thereof using the third optical system;

inserting the stage between the first optical system and the second optical system, capturing the second part held on the stage using the first optical system, and also capturing a stage reference mark, which is appended to the stage and can be recognized from below, using the second optical system;

calculating the relative position between the first part and the suction head using the image information from said first optical system, second optical system, and third optical system, and the relative position between the second part and the stage;

moving said suction head and stage to a mounting position, recognizing said head reference mark and stage reference mark in the mounting position using said first and second optical systems, and subjecting at least one of the suction head and the stage to position correction using said position information and said relative position information such that the positions of the first part and the second part have a predetermined relation; and

mounting the first part and the second part following said position correction.

2. The method for mounting a light emitting element according to Claim 1, wherein

said step of preparing the first optical system and the second optical system includes a step of measuring the amount of optic-axis deviation between the first optical system and the second optical system by inserting a single calibration mark, which can be recognized from both above and below, between the first optical system and the second optical system, and capturing this calibration mark using the first optical system and the second optical system.

3. The method for mounting a light emitting element according to Claim 1, wherein said step of preparing the first optical system and the third optical system includes a step of measuring the amount of optic-axis deviation between the first optical system and the third optical system by inserting a calibration mark of which the relative spatial relationships from above and from the horizontal direction are known between the first optical system and the third optical system, and capturing this calibration mark using the first optical system and the third optical system.

4. The method for mounting a light emitting element according to Claim 2 or claim 3, wherein said calibration mark is a mark provided on said suction head or said stage.

5. The method for mounting a light emitting element according to claim 1, wherein in said step of making the first part emit light, and recognizing the optic axis thereof using the third optical system, an emitting light state of the first part is measured, and the first part is discarded as a defective article without proceeding to the subsequent steps in the event that the emitting light state thereof deviates from a reference value.

6. The method for mounting a light emitting element according to claim 1, wherein said first optical system, second optical system, and third optical system are held at fixed spatial relationships throughout the step of capturing said head reference mark and first part, the step of capturing said second part and stage reference mark, the step of subjecting at least one of said suction head and stage to position correction, and the step of mounting the first part and the second part.

7. The method for mounting a light emitting element according to claim 1, wherein said step of position correction between the suction head and the stage at the mounting position includes the steps of:

recognizing said head reference mark and stage reference mark using said first and second optical systems, and subjecting the suction head and the stage to temporal tacking using said relative position information such that the positions of the first part and the second part are in a predetermined relation; and

consecutively capturing the head reference mark and the stage reference mark using the first and second optical systems while heating one or both of said suction head and stage for bonding, and subjecting the suction head and the stage to relative position correction so as to maintain the relative spatial relationships of said temporal tacking step.

8. The method for mounting a light emitting element according to claim 1, wherein said step of mounting the first part and the second part measures the relative distance in the vertical direction between the first part and the second part using the third optical system, and mounts the first part and the second part while correcting a gap therebetween.

9. A device for mounting a light emitting element by mounting a first part serving as a light emitting element having an optic axis toward the horizontal direction while aligning the first part with a second part, the device comprising:

a suction head for suctioning the first part at the lower end portion of the suction head, and having a head reference mark which can be recognized from above;

a stage for holding the second part at the upper end portion of the stage, and having a stage reference mark which can be recognized from below;

a driving mechanism for relatively moving said suction head and stage in the X, Y, and θ directions;

a first optical system, which is disposed above said suction head, for capturing the second part held on the stage and the head reference mark;

a second optical system, which is disposed below said stage so as to generally face the optic axis of the first optical system, for capturing the first part suctioned at

the suction head and the stage reference mark;

a third optical system, which is disposed such that the direction of the optic axis thereof is generally orthogonal to the first optical system, for capturing the optic axis on the basis of light emitted by the first part;

a calculating device for calculating the relative position between the first part and the suction head, and the relative position between the second part and the stage using image information from said first through third optical systems;

a control device for recognizing said head reference mark and stage reference mark using said first and second optical systems with said suction head and stage in a mounting position, subjecting the suction head and the stage to position correction using said position information and said relative position information such that the positions of the first part and the second part are in a predetermined relation.

10. The device for mounting a light emitting element according to Claim 9, wherein at least one of said suction head and stage comprises:

a part suction hole;

a hollow portion which is provided behind said suction hole, and communicates with the part suction hole;

a transparent body which covers an end of the hollow portion such that the part suction hole can be seen through the transparent body;

an air suctioning source connected to said hollow portion; and

a heater which is fixed near said part suction hole;

wherein the part suction hole can be recognized through said transparent body as a head reference mark or stage reference mark.

11. The device for mounting a light emitting element according to Claim 10, wherein said suction head or stage is attached to said driving mechanism via a bracket;

and wherein a cavernous portion is formed in said bracket, into which the first or second optical system can be inserted for capturing the part suction hole via said transparent body.

12. The device for mounting a light emitting element according to claim 9, further

comprising a power source unit for making said first part emit light for enabling said third optical system to recognize the optic axis of the first part.

13. The device for mounting a light emitting element according to claim 9, wherein said third optical system captures the first part and the second part, or the suction head and stage from the side;

wherein said calculation device calculates the relative distance in the vertical direction between the first part and the second part using the image information from the third optical system; and

wherein said control device corrects a gap between the first part and the second part based on said relative distance information.